PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of:	Confirmation No.: 1355
KENNETH O. McELRATH ET AL.	Group Art Unit: 2879
Serial No.: 10/719,693	Examiner: Natalie K. Walford
Filed: November 21, 2003	Attorney Docket: 3006.002000/KDG
For: CARBON NANOTUBE PARTICULATE ELECTRON EMITTERS	**CUSTOMER NO. 23720**

APPEAL BRIEF

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants submit this Appeal Brief pursuant to 37 C.F.R. § 41.37. If the fee payment submitted with this brief is missing or insufficient, please deduct the fee from Williams, Morgan & Amerson, P.C. Deposit Account No. 50-0786/3006.002000KG.

I. REAL PARTY IN INTEREST

The real party in interest is Carbon Nanotechnologies, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences, or judicial proceedings known to appellant, appellant's legal representative, or the assignee which are related to, directly affect, or are directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-10 are rejected and are the subject of this appeal. Claims 11-23 are canceled.

IV. STATUS OF AMENDMENTS

No amendments have been filed in this application after the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claims relate to electron emitters that comprise a carbon nanotube particulate on a surface. A brief explanation of carbon nanotubes is given in the application at page 2, line 14 through page 3, line 13. The carbon nanotube particulate in the claimed invention comprises entangled small-diameter carbon nanotubes arranged in a three-dimensional network. The small-diameter nanotubes have an outer diameter in a range of about 0.5 nm and about 3 nm, and the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns. (See page 7, lines 9-30, and page 4, line 23, through page 5, line 1.)

Examples of such carbon nanotube particulates are shown in Figures 1A and 1B. Certain uses of such electron emitters are described at page 31, line 26 through page 32, line 28.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Are claims 1-10 unpatentable under 35 U.S.C. § 103(a) in view of Smalley et al., US Pub. 2002/0085968 ("*Smalley*") and Jin et al., U.S. Patent 6,250,984 ("*Jin*")?

B. Are claims 1-2 and 5-6 unclear and indefinite due to the use of the term "cross-sectional dimension"?

VII. ARGUMENT

A. THE CLAIMS ARE NONOBVIOUS OVER THE PRIOR ART

The Examiner rejected Claims 1-10 under 35 U.S.C. § 103(a) as obvious over Smalley et al., US Pub. 2002/0085968 ("*Smalley*") in view of Jin et al., U.S. Patent 6,250,984 ("*Jin*"). Claim 1 requires, *inter alia,* an electron emitter that comprises a "carbon nanotube particulate on a surface wherein the carbon nanotube particulate comprises entangled small-diameter carbon nanotubes arranged in a three-dimensional network . . . wherein the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns."

Jin discloses a process for fabricating nanotube field emitter structures. As shown in Figures 2A-2F and described at column 5, line 40 through column 9, line 11, the process begins by mixing carbon nanotubes 10 (e.g., a "tangled spaghetti" configuration) and conductive powder 12 (e.g., metal or alloy powder). (Figure 2A, and column 5, lines 43-64.) Next, the composite of nanotubes and conductive powder is pressed into a green compact 14 and either sintered or melted to form an ingot. (Figure 2B, and column 7, lines 35-55.) Next, the ingot is

sectioned parallel to the intended emitter surface. (Figure 2C, and column 8, lines 1-8.) The sectioning creates a number of broken nanotube ends at the sectioned surface.

After shaping the ingot (Figure 2D, and column 8, lines 16-19), a layer of metal is etched from the ingot 17 surface, to provide a "multitude of protruding nanotubes." (Figure 2E, and column 8, lines 28-31.) Although the nanotube ends that protrude from the ingot are not necessarily parallel to each other, "the average deviation of the long axis of the nanotubes from a line normal to the supporting surface at the point on the surface from which the nanotube protrudes, is less than 45° . . . ." (Column 8, lines 47-67.) The structure produced by this process can then be assembled into a field emitting device. (Figure 2F, and column 9, lines 3-11.)

Therefore, although the ingot prepared by *Jin* contains a spaghetti-like mass of nanotubes, they are buried under the surface of the ingot. All that protrudes from the surface of the ingot are individual nanotubes, as can be seen clearly in Figures 2E and 12. (See the nanotube emitters 112 in Figure 12, which are described at column 15, lines 38-42.) Thus, the nanotube structures that are *on* the surface in *Jin* (i.e., extending outward from the surface) are not particulates that each comprise a plurality of entangled nanotubes, but instead are individual nanotubes. The carbon nanotubes arranged in a three-dimensional network in *Jin* are beneath the surface of the ingot, not *on* the surface as required by claim 1. Furthermore, *Jin* makes no suggestion that there should be a particulate that comprises entangled carbon nanotubes on top of a surface. *Jin* actually teaches away from such a structure, since *Jin* emphasizes the importance of emission from individual broken nanotube tips, rather than from a tangled aggregate of nanotubes. (Column 4, lines 38-55.)

Smalley teaches a felt or a mat comprising a tangled collection of single-wall carbon nanotube ropes stuck together having sizes of 10 mm^2, 100 mm^2, 1000 mm^2 or greater. (See

Smalley, paragraph 89.) Mats and felts are two out of many different nanotube structures disclosed by *Smalley*, and there is no suggestion that these structures should or could be used as electron emitters. Furthermore, the dimensions that the Examiner references in paragraph 88 of *Smalley* relate to ropes of nanotubes, as opposed to the felt in paragraph 89 which comprises a collection of multiple ropes stuck together in a mat. (See *Smalley* at paragraph 89, lines 1-4.) Therefore, even if one could consider the felt of *Smalley* to be relevant to electron emitters, which *Smalley* plainly does not suggest, the dimensional range recited in claim 1 for the nanotube particulate would still not be satisfied by the felt of *Smalley*.

An obviousness rejection based on a combination of references requires a motivation or suggestion to combine the references, coupled with a reasonable expectation of success. The motivation or suggestion must be in the prior art, in the knowledge of one of ordinary skill in the relevant art, or in some cases in the nature of the problem to be solved. *In re Huston*, 308 F.3d 1267, 64 U.S.P.Q.2d 1801, 1810 (Fed. Cir. 2002); *Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 65 U.S.P.Q.2d 1961, 1971-1972 (Fed. Cir. 2003).

Furthermore, the references must suggest the desirability, and thus the obviousness of making the combination, without the benefit of hindsight reasoning. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not in applicant's disclosure. "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988).

There is no motivation or suggestion to combine the nanotube emitter structure of *Jin*, in which a tangled mass of nanotubes are buried in a metal ingot and only individual nanotube tips protrude from the surface of the ingot, with the felt or mat of *Smalley*, which has nothing to do

with electron emitters. Furthermore, even if one did make this combination, there is still nothing to suggest that the tangled mass of carbon nanotubes should be on the surface of a substrate, rather than buried in that substrate.

Because a *prima facie* case of obviousness has not been established for claim 1, this claim cannot be held obvious under 35 U.S.C. § 103(a). Claims 2-10 depend directly or indirectly on claim 1 and are nonobvious for same reasons.

B. THE CLAIMS ARE DEFINITE AND MEET THE REQUIREMENTS OF 35 U.S.C § 112

The Examiner has objected to Claims 1-2 and 5-6 and contends that the term "cross-sectional dimension" is unclear. Although the office action does not explicitly state that these claims are rejected as being indefinite under 35 U.S.C. § 112, second paragraph, in case the objection might be construed to include such a rejection implicitly, applicant will explain herein why these claims meet all applicable requirements.

Section 112, second paragraph, requires that the claims, when read in light of the specification, reasonably apprise a person skilled in the art of the scope of the invention. *Utah Medical Products, Inc. v. Graphic Controls Corp.,* 350 F.3d 1376, 69 U.S.P.Q.2d 1136, 1139 (Fed. Cir. 2003). If a person of ordinary skill in the art would understand the claim, then § 112, second paragraph, is satisfied. *In re Oetiker,* 23 U.S.P.Q.2d 1661, 1662 (Fed. Cir. 1991).

The Examiner has stated that the meaning of "cross-sectional dimension" is unclear in the subject claims. Claim 1, for example, states that "the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns." Examples of the carbon nanotube particulates are shown in Figures 1A and 1B. From the examples shown in these figures, one can see that the particulates can have a range of cross-sectional dimensions.

Applicant has used the term "cross-sectional dimension" in accordance with the usual and customary meaning of the words as defined in *The American Heritage Dictionary, Second College Edition*, Houghton Mifflin Company, Boston, 1982. In this dictionary, the word "cross-section" is defined as "[a] section formed from a plane cutting through an object, usually at right angles to an axis." The word "dimension" is defined as "[a] measure of spatial extent, esp. width, height, or length." (Copies of these dictionary definitions are included in the Evidence Appendix.) Therefore, applicant believes that the term "cross-sectional dimension" is clear and would be understood by a person skilled in the art. That is all that is required by § 112, second paragraph.

VIII. CLAIMS APPENDIX

The claims that are the subject of the present appeal (1-10) are listed in the attached Claims Appendix.

IX. EVIDENCE APPENDIX

Attached in the Evidence Appendix are copies of dictionary definitions of "cross section" and "dimension." These documents were introduced into the record as attachments to the response to office action that was filed on October 11, 2006.

X. RELATING PROCEEDINGS APPENDIX

There is no Related Proceedings Appendix for this appeal.

XI. CONCLUSION

Applicants respectfully request that the rejections of claims 1-10 be reversed.

Respectfully submitted,

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December 21, 2006

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CLAIMS APPENDIX

1. An electron emitter comprising a carbon nanotube particulate on a surface wherein the carbon nanotube particulate comprises entangled small-diameter carbon nanotubes arranged in a three-dimensional network wherein the small-diameter nanotubes have an outer diameter in a range of about 0.5 nm and about 3 nm, wherein the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns.

2. The electron emitter of claim 1 wherein the particulate has a cross-section dimension in the range of about 0.1 micron and about 3 microns.

3. The electron emitter of claim 1 wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, quadruple-walled carbon nanotubes and combinations thereof.

4. The electron emitter of claim 1 wherein the carbon nanotube particulate comprises ropes of carbon nanotubes.

5. The electron emitter of claim 4 wherein the ropes have a cross-sectional dimension in a range of about 10 nm and about 50 nm.

6. The electron emitter of claim 4 wherein the ropes have a cross-sectional dimension less than 10 nm.

7. The electron emitter of claim 4 wherein the carbon nanotube particulates comprise small-diameter carbon nanotubes having more than about 10 small-diameter carbon nanotubes/μm^2 surface area of the carbon nanotube particulates.

8. The electron emitter of claim 4 wherein the carbon nanotube particulate on the surface has been activated by etching.

9. The electron emitter of claim 4 wherein the electron emitter is a component in a cathode of a field emission device.

10. The electron emitter of claim 9 wherein the field emission device is selected from the group consisting of electron tubes, amplifiers, oscillators, mixers, microwave components, discharge initiators, laser tubes, spark gaps, controlled discharge tubes, directed energy devices, display tubes, flat-panel displays and combinations thereof.

EVIDENCE APPENDIX

Definitions from *The American Heritage Dictionary, Second College Edition*, Houghton Mifflin Company, Boston, 1982. These documents were introduced into the record as attachments to the response to office action that was filed on October 11, 2006.

RELATED PROCEEDINGS APPENDIX

None.

ade). —*intr.* To question a person closely. —**cross'-ex-am'i-na'tion** *n.* —**cross'-ex-am'in-er** *n.*

cross-eye (krôs'ī', krŏs'ī') *n.* A form of strabismus in which one or both eyes deviate toward the nose. —**cross'-eyed'** *adj.*

cross-fer-til-i-za-tion (krôs'fûr'tl-ĭ-zā'shən, krŏs'-) *n.* **1.** *Biol.* Fertilization by the union of gametes from different individuals, often of different varieties or species. **2.** *Bot.* Fertilization of the ovule of one plant or flower by pollen nuclei from another. —**cross'-fer'tile** *adj.*

cross-fer-til-ize (krôs'fûr'tl-īz', krŏs'-) *tr. & intr.v.* **-ized, -iz-ing, -iz-es.** To fertilize or be fertilized by means of cross-fertilization.

cross-file (krôs'fīl', krŏs'-) *intr. & tr.v.* **-filed, -fil-ing, -files.** To register as a candidate in the primaries of more than one political party. —**cross'-fil'er** *n.*

cross-fire (krôs'fīr', krŏs'-) *n.* **1.** Lines of fire from two or more positions crossing each other at a single point: *soldiers caught in crossfire.* **2.** A situation in which a number of things originating from different sources come together. **3.** A rapid, often agitated discussion.

cross-grained (krôs'grānd', krŏs'-) *adj.* **1.** Having an irregular, transverse, or diagonal grain. **2.** Troublesome to deal with; contrary.

cross hair *n.* Either of two fine strands of wire crossed in the focus of the eyepiece of an optical instrument and used as a calibration or sighting reference.

cross-hatch (krôs'hăch', krŏs'-) *tr.v.* **-hatched, -hatch-ing, -hatch-es.** To mark with two or more sets of intersecting parallel lines. —**cross'hatch'** *n.*

cross-head (krôs'hĕd', krŏs'-) *n.* A beam that connects the piston rod to the connecting rod of a reciprocating engine.

cross-in-dex (krôs'in'dĕks', krŏs'-) *v.* **-dexed, -dex-ing, -dex-es.** —*tr.* To furnish (an index) with cross-references. —*intr.* To furnish cross-references. —**cross'-in'dex** *n.*

crossing (krô'sĭng, krŏs'ĭng) *n.* **1.** A place at which roads, lines, or marks intersect; intersection. **2.** The place at which something, such as a river or highway, may be crossed. **3.** The intersection of the nave and transept in a cruciform church.

crossing over *n.* The exchange of genetic material between homologous chromosomes.

cross matching *n.* The process in which blood compatibilities are tested between a donor and a recipient before transfusion.

cross-mul-ti-ply (krôs'mŭl'tə-plī, krŏs'-) *intr.v.* **-plied, -ply-ing, -plies.** To multiply the numerator of one of a pair of fractions by the denominator of the other. —**cross multiplication** *n.*

cross-over (krôs'ō'vər, krŏs'-) *n.* **1.** A place at which or the means by which a crossing is made. **2.** A short connecting track by which a train can be transferred from one line to another. **3.** *Genetics.* **a.** A crossing over. **b.** A character resulting from crossing over. **4.** A registered member of one political party who votes in the primary of the other party. —*modifier: the crossover vote in California.*

cross-patch (krôs'păch', krŏs'-) *n. Informal* A peevish, irascible person. [cross + obs. *patch*, jester.]

cross piece (krôs'pēs' krŏs'-) *n.* A transverse piece, as of a structure.

cross-pol-li-nate (krôs'pŏl'ə-nāt', krŏs'-) *tr.v.* **-nat-ed, -nat-ing, -nates.** *Bot.* To cross-fertilize (a plant or flower). —**cross-pol'li-na'tion** *n.*

cross product *n.* Vector product.

cross-pur-pose (krôs'pûr'pəs, krŏs'-) *n.* A conflicting or contrary purpose. —*Idiom.* **be at cross-purposes.** To have or act under a misunderstanding of each other's purposes.

cross-ques-tion (krôs'kwĕs'chən, krŏs'-) *tr.v.* **-tioned, -tion-ing, -tions.** To question closely; cross-examine. —*n.* A question asked in the process of cross-examination.

cross-re-ac-tion (krôs'rē-ăk'shən, krŏs'-) *n.* The reaction between an antigen and an antibody that was generated against a different antigen. —**cross'-re-act'** *v.* **(-act-ed, -act-ing, -acts).** —**cross'-re-ac'tive** *adj.* —**cross'-re-ac-tiv'i-ty** *n.*

cross-refer (krôs'rĭ-fûr', krŏs'-) *v.* **-ferred, -fer-ring, -fers.** *tr.* To refer from one part or passage to another. —*intr.* To make a cross-reference.

cross-ref-er-ence (krôs'rĕf'ər-əns, -rĕf'rəns, krŏs'-) *n.* A reference from one part of a book, index, catalogue, or file to another part containing related information.

cross-road (krôs'rōd', krŏs'-) *n.* **1.** A road that intersects another road. **2. crossroads.** *(used with a sing. verb).* **a.** A place where two or more roads meet. **b.** A place where different cultures meet. **c.** A crucial point or place.

cross-ruff (krôs'rŭf', -rŭf', krŏs'-) *n.* A series of plays in games of the whist family where partnership hands alternately ruff suits led by the other partner. —*v.* **-ruffed, -ruff-ing, -ruffs.** —*intr.* To perform a crossruff or a series of crossruffs. —*tr.* To ruff (one's partner's lead or a lead from the dummy) in alternating plays.

cross section *n.* **1. a.** A section formed by a plane cutting through an object, usually at right angles to an axis. **b.** A view so cut or a graphic representation of such a piece. **2.** *Physics.* A measure of the probability of occurrence of a particular atomic or nuclear reaction. **3.** A representative sample meant to be typical of the whole. —**cross'-sec'tion-al** *adj.*

cross-stitch (krôs'stĭch', krŏs'-) *n.* **1.** *a.* Sewing and embroidery, a double stitch forming an X. **2.** Needlework made with cross-stitches. —*v.* **-stitched, -stitch-ing, -stitch-es.** —*tr.* To make or embroider with cross-stitches. —*intr.* To work in cross-stitch.

cross-talk (krôs'tôk', krŏs'-) *n.* Noise or garbled sounds heard on a telephone or other electronic receiver, caused by interference from another channel.

cross-tie (krôs'tī', krŏs'-) *n.* A transverse beam or rod serving as a support, esp. a beam that connects and supports the rails of a railroad.

cross-town (krôs'toun', krŏs'-) *adj.* Running or extending across a city or town: *a cross-town bus.* —*adv.* Across a city or town.

cross-tree (krôs'trē', krŏs'-) *n. Naut.* One of the two horizontal crosspieces at the upper ends of the lower masts in fore-and-aft-rigged vessels, serving to spread the shrouds.

cross vault *n.* A vaulting formed by the intersection of two or more simple vaults.

cross-walk (krôs'wôk', krŏs'-) *n.* A path marked off for pedestrians crossing a street.

cross-way (krôs'wā', krŏs'-) *n.* A crossroad.

cross-ways (krôs'wāz', krŏs'-) *adv.* Variant of **crosswise.**

cross-wind (krôs'wind', krŏs'-) *n.* A wind blowing at right angles to a given direction, as to an aircraft's line of flight.

cross-wise (krôs'wīz', krŏs'-) also **cross-ways** (-wāz') *adv.* Across.

cross-word puzzle (krôs'wûrd', krŏs'-) *n.* A puzzle in which an arrangement of numbered squares is to be filled with words running both across and down in answer to correspondingly numbered clues.

crotch (krŏch) *n.* **1.** The angle or region of the angle formed by the junction of two parts or members, such as two branches, limbs, or legs. **2.** The fork of a pole or other support. [Poss. alteration of CRUTCH.] —**crotched** (krŏcht) *adj.*

crotch-et (krŏch'ĭt) *n.* **1.** A small hook or hooklike structure. **2.** An odd, whimsical, or stubborn notion. **3.** *Mus.* A quarter note. [ME *crochet* < OFr. —see CROCHET.]

crotch-et-y (krŏch'ĭ-tē) *adj.* Capriciously stubborn or eccentric; perverse. —**crotch'et-i-ness** *n.*

croton (krōt'n) *n.* **1.** Any of various chiefly tropical plants, shrubs, or trees of the genus *Croton.* **2.** Any of various tropical plants of the genus *Codiaeum*, esp. *C. variegatum pictum*, frequently grown as a house plant for its showy, varicolored foliage. [NLat. *Croton*, genus name < Gk. *kroton*, castor oil plant.]

Croton bug *n.* A small light-brown cockroach, *Blatella germanica*, that is a common household pest. [After the *Croton* River, New York.]

croton-ic acid (krō-tŏn'ĭk) *n.* An organic acid, $C_4H_6O_2$, used in the preparation of pharmaceuticals and resins. [< NLat. *Croton*, plant genus. —see CROTON.]

croton oil *n.* A yellowish-brown, violently cathartic oil obtained from the seeds of a tree, *Croton tiglium*, of southeastern Asia.

crouch (krouch) *v.* **crouched, crouch-ing, crouch-es.** —*intr.* **1.** To stoop with the limbs pulled close to the body. **2.** To bend servilely or timidly; cringe. —*tr.* To cause to bend low, as in fear or humility. —*n.* The act or posture of crouching. [ME *crouchen* < OFr. *crochir*, to be bent < *croc*, hook.] —**crouch'ing-ly** *adv.*

croup[1] (krōōp) *n.* A pathological condition affecting the larynx in children, characterized by respiratory difficulty and a harsh cough. [Orig. unknown.] —**croup'ous** (krōō'pəs), **croup'y** *adj.*

croup[2] also **croupe** (krōōp) *n.* The rump of certain animals, esp. a horse. [ME *croupe* < OFr., of Germanic orig.]

crou-pi-er (krōō'pē-ər, -pē-ā') *n.* An attendant at a gaming table who collects and pays bets. [Fr. < *croupe*, rump, croup < OFr.]

crou-ton (krōō'tŏn', krōō-tŏn') *n.* A small crisp piece of toasted or fried bread. [Fr. *croûton* < *croûte*, crust < OFr. *croste* < Lat. *crusta.*]

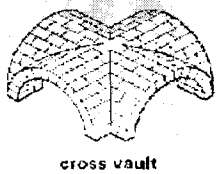
crow[1] (krō) *n.* **1.** Any of several large, glossy, black birds of the genus *Corvus*, having a characteristic raucous call, esp. *C. brachyrhynchos*, of North America. **2.** A crowbar. —*Idioms.* **as the crow flies.** In a straight line. **eat crow.** *Informal* To be forced into a humiliating situation, as from having been in error. [ME *crowe* < OE *crāwe.*]

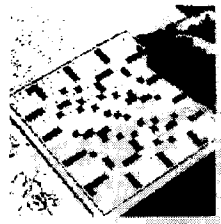
crow[2] (krō) *intr.v.* **crowed, crow-ing, crows. 1.** *Past tense and past participle* **crowed** or **crew** (krōō). To utter the shrill cry characteristic of a cock or rooster. **2. a.** To exult blatantly, esp. over the misfortune of another. **b.** To brag or boast exultantly. **3.** To make a sound expressive of pleasure or well-being, characteristic of an infant. —*n.* **1.** The shrill cry of a cock. **2.** An inarticulate sound expressive of pleasure or delight. [ME *crowen* < OE *crāwan.*]

Crow (krō) *n., pl.* **Crow** or **Crows. 1. a.** A tribe of Indians, formerly inhabiting the region between the Platte and Yellowstone rivers and now settled in southeastern Montana. **b.** A member of this tribe. **2.** The Siouan language of the Crow.

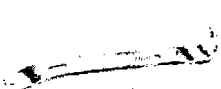
crow-bar (krō'bär') *n.* A straight bar of iron or steel, with the working end shaped like a forked chisel, used as a lever.

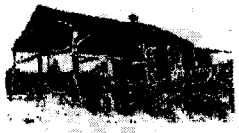

crosstree


cross vault


crossword puzzle


crow[1]


crowbar



dilapidate
A dilapidated building

di-men-sion (dĭ-mĕn'shən, dī-) *n.* **1.** A measure of spatial extent, esp. width, height, or length. **2.** Often **dimensions.** Extent; magnitude; size; scope. **3.** *Math.* **a.** Any of the least number of independent coordinates required to specify a point in space uniquely. **b.** The range of any of these coordinates. **4.** *Physics.* A physical property, often mass, length, time, or a combination thereof, regarded as a fundamental measure or as one of a set of fundamental measures of a physical quantity: *Velocity has the dimensions of length divided by time.* —*tr.v.* **-sioned, -sion·ing, -sions.** To cut or shape to specified dimensions. [ME *dimensioun* < OFr. *dimension* < Lat. *dimensio*, extent < *dimensus*, p.part. of *dimetiri*, to measure : *dis-* (intensive) + *metiri*, to measure.] —**di-men'sion·al** *adj.* —**di-men'sion·al·i·ty** (-shə-năl'ĭ-tē) *n.* —**di-men'sion·al·ly** *adv.* —**di-men'sion·less** *adj.*

di-mer (dī'mər) *n.* **1.** A molecule consisting of two identical simpler molecules. **2.** A chemical compound consisting of dimers.

di-mer·ic (dī-mĕr'ĭk) *adj. Biol.* Composed of two parts or divisions.

dim·er·ous (dĭm'ər-əs) *adj.* **1.** Consisting of two parts or segments, as the tarsus in certain insects. **2.** *Bot.* Having flower parts, such as petals, sepals, and stamens, in sets of two. —**dim'er·ism** *n.*

dime store *n.* Five-and-ten.

dim·e·ter (dĭm'ĭ-tər) *n.* A verse consisting of two metrical feet or of two dipodies. [LLat. < Gk. *dimetros*, having two meters : *di-*, two + *metron*, meter.]

di-meth-yl (dī-mĕth'əl) *n.* Ethane.

di-meth-yl-sulf-ox-ide (dī-mĕth'əl-sŭl-fŏk'sīd') *n.* A colorless hygroscopic liquid, $(CH_3)_2SO$, obtained from lignin, used as a solvent and in medicine as a skin penetrant to convey medications into the tissues.

di-min-ish (dĭ-mĭn'ĭsh) *v.* **-ished, -ish·ing, -ish·es.** —*tr.* **1. a.** To make smaller or less or cause to appear smaller or less. **b.** To detract from the authority, rank, or prestige of. **2.** To cause to taper. **3.** *Mus.* To reduce (a perfect or minor interval) by a semitone. —*intr.* **1.** To become smaller or less. **2.** To taper. [ME *demunishen*, blend of *diminuen*, to lessen (< OFr. *diminuer* < Lat. *deminuere* : *de-*, from + *minuere*, to lessen) and *minishen*, to reduce (< OFr. *minuiser* < VLat. **minutiare* < Lat. *minutia*, smallness < *minutus*, small, p.part. of *minuere*, to lessen).] —**di-min'ish·a·ble** *adj.* —**di-min'ish·ment** *n.*

diminishing returns *pl.n.* The rate at which profits diminish in proportion to the amount of further investment after a certain point.

di-mi-nu-en-do (dĭ-mĭn'yōō-ĕn'dō) *n., adj., & adv. Mus.* Decrescendo. [Ital., diminishing < Lat. *deminuendus*, gerund of *deminuere*, to diminish.]

dim·i·nu·tion (dĭm'ə-nōō'shən, -nyōō'-) *n.* **1. a.** The act or process of diminishing. **b.** The resulting reduction; decrease. **2.** *Mus.* The repetition of a theme in notes one-quarter or one-half the duration of the original. [ME *diminucioun* < OFr. *diminucion* < Lat. *deminutio* < *deminuere*, to diminish.] —**dim'i·nu'tion·al** *adj.*

di-min-u-tive (dĭ-mĭn'yə-tĭv) *adj.* **1.** Of very small size; tiny. **2.** Designating certain suffixes that denote smallness, youth, familiarity, or affection, as *-let* in *booklet* or *-kin* in *lambkin.* —*n.* A diminutive suffix, word, or name. [ME *diminutif* < OFr. < Lat. *deminutivus* < *deminutus*, p.part. of *deminuere*, to diminish.] —**di-min'u·tive·ly** *adv.* —**di-min'u·tive·ness** *n.*

dim·i·ty (dĭm'ĭ-tē) *n., pl.* **-ties.** A sheer, crisp cotton fabric, usually corded or checked. [ME *demyt* < Med. Lat. *dimitum* < Med. Gk. *dimitos*, double-threaded : Gk. *di-*, two + *mitos*, thread.]